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LIFE ALONG A GRADED RIVER

BY

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But the very advantage of the meander swinging up to the bluffs at Brunswick carried with it a danger which all towns similarly situated must face. A flood plain meander is not stationary, but moves down the valley. The *filum aquae,* as the law terms it, or the thread of fastest current, does not occupy the middle of the stream, especially in a bend. Typically the fastest current moves as in Fig. 9. The greatest erosion is at the base (AB) of the projecting spur and the

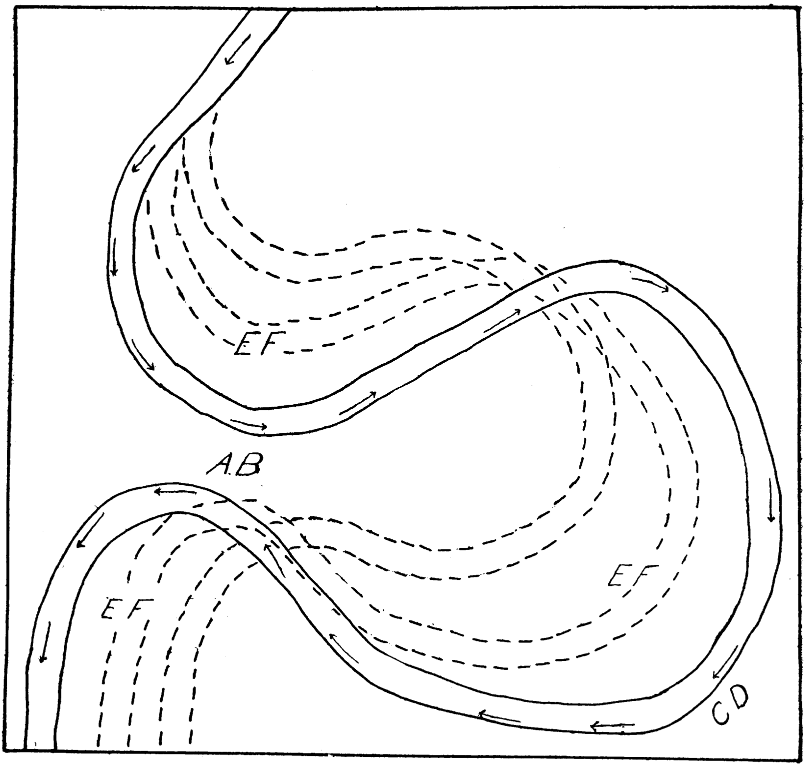

FIG. 9—Diagram to show the movement of a meander down stream. The broken lines represent former positions of the river. The arrows show the "thread" of the current.

outer and down stream side of the meander (CD). Thus the meander moved past Brunswick and finally about 1874 the river cut through its spur leaving the town several miles inland. The Grand River still occupies the eastern part of the old meander, but the channel rapidly silted up, and Brunswick was effectually shut off from the Missouri. Fortunately this cut off did not occur until the river traffic had become unimportant, and the business of Brunswick did not suffer greatly from the loss of river traffic.

The same danger has constantly threatened Glasgow. It is only by construction of revetments by the government and by reinforcing the embankments of the Chicago and Alton railroad which crosses here, that the threatened cut off has been averted. (Fig. 10.)

When the river begins actively to erode the bank of the bend, it often deposits on the opposite bank, as at E F in Fig. 9. That is the coarser load, mostly sand, which settles in the quieter water. When this occurs the river people say that the river is "throwing up sand banks." Thus construction often, but not always, accompanies destruction. These sand bars at low water become covered by a growth of willows which are often followed by a cottonwood growth. At high water the dense vegetation arrests the silt and fine sand and the bar becomes arable land. Between these bars there are often semi crescentic lakes. The entire region south of Brunswick which was at various times the bed of the river, is now composed of these ridges with the intervening lakes.

The river towns were not destined to hold their prosperity. The maximum development of the river trade occurred between 1850 and 1860. At that time one or more boats might usually be seen at any stretch of the river. In the early sixties, railroads were built paralleling the river and they took away most of the through traffic and much of the local traffic. Branches were soon built to the principal river towns and the boat traffic ceased to be profitable. Brunswick and Glasgow became terminal or division points and did not suffer so severely as many other river towns.

Agriculture. The soils of the flood plain are, of course, alluvial and their composition differs according to the velocity of the current by which they are deposited. Where the current was rapid, the soil is largely sand; where it was slower, the soil is a sandy loam or silt. Where the conditions are typical, the soil near the river is sandy and it grades in fineness away from the water through sandy loams, silt loams, to silt and clay. Often old ox bow lakes, the result of cut offs, which are entirely drained may be traced by their accompanying soil types. The old channel is often silt and clay; on one or both sides there may be a low ridge of sandy soil where the overflowing river first deposited its coarse load and from this ridge the soil grades into loam and silt as one withdraws from the old channel. (Fig. 11.)

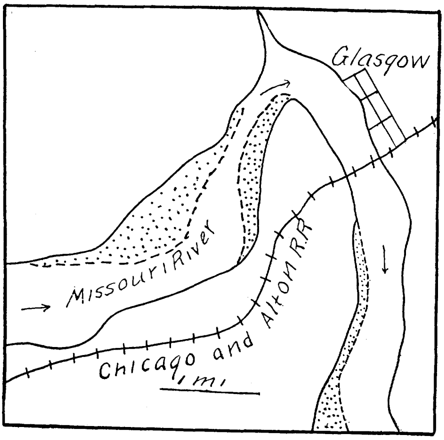

Fig. 10—Map to show river erosion near Glasgow from 1878-79 to 1880. The dotted areas were eroded between 1878-79 and 1880. (From maps of the Missouri River Commission.)

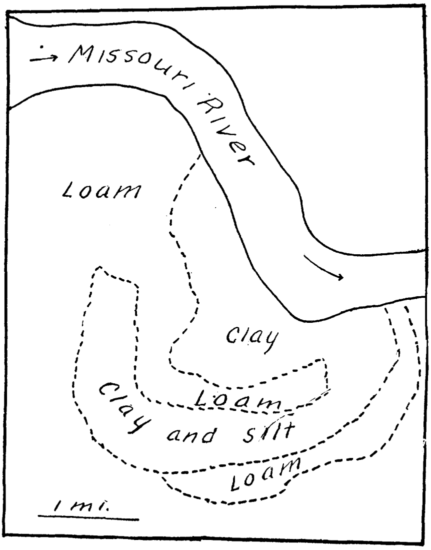

Fig. 11—Based on Soil Survey of Saline County, Mo., in 1904.

The clay soil is locally called "gumbo." It is a heavy moist soil usually requiring artificial drainage. When drying it cracks often to the depth of fifteen inches and these cracks intersect each other giving a field a curious columnar appearance. When drained, "gumbo" is fertile soil and yields good crops, especially of wheat. The loams are the valuable lands of the flood plains, and not seldom are worth $200 per acre. They give large yields of wheat and corn. Sandy tracts are relatively or absolutely barren. Only when they have supported vegetation for several years do they become covered with silt and worth cultivation. However, sandy tracts are often bought very cheap and held in the hope that some flood will cover the surface with silt and thus make it fertile. Often a farmer will point to a field, formerly worthless, which now brings him twenty or more bushels of wheat to the acre. On the other hand, a flood sometimes covers a fertile field with sand, making it almost worthless. Again, the floods, especially in June, may stand upon the fields so long as to drown the growing corn and wheat. Finally, there is the constant menace of river erosion, especially in the vicinity of bends. Entire farms sometimes crumble into the river in a few weeks.

The uncertainty is somewhat reflected in the agricultural methods, the land tenure and the social habits of the people. Much of the flood plain is held in large farms which are worked by tenants. The large farms are in many cases survivals of conditions in the preceding generation when lands were cheaper and large holdings common. The good soil is almost inexhaustible and yields good incomes to the owners who often live elsewhere. However, owners of small holdings, and tenants emphasize the uncertain conditions along the graded river. A man with moderate capital hesitates to invest in land which may disappear. The law provides that when the river erodes land, the owner loses all title thereto, even if, in subsequent years, the river should again restore land to the former site. Then again the possibility of crop destruction or of the land being covered with sand are deterrents to the man of moderate capital. Many of the farm buildings are incommodious and in poor repair. There is an indisposition toward making permanent improvements. For the most part, the churches and schools are located on the adjacent higher country as are practically all the villages. As far as possible, the workers on the flood plains live on the higher lands on either side.

Water Supply and Health. As compared with the uplands, the problem of water supply on the flood plain is simple. Abundant water is nearly always found by sinking wells to the low water level. At a distance from the river, the water is usually well filtered in passing through the gravel and sand of the flood plain. Open wells are often partially filled with sediment at flood time and all wells are subject to contamination from ground water. However, with reasonable care, the water supply on the flood plain is pure.

Malaria, "the chills," has always been a plague along the flood plain. Time and again its ravages have caused the depopulation of districts and towns. Cox's Bottom was settled before 1820, but a severe epidemic of malaria drove most of the settlers out. Often they abandoned partially cleared farms and cabins to escape the "chills." Old Chariton as we have seen, was laid out in 1817, a short distance from Glasgow, but was abandoned in 1829 largely because of malaria. With better drainage, the malaria is decreasing in most parts of the flood plain.

Slavery. Slavery acquired a considerable foothold in Missouri. (Fig. 12.) Its controlling influences were complex but were, to a considerable extent, geographic. Up to 1860 a large majority of the settlers came from slave holding States and brought their slaves with them. The ordinance of 1787 prevented slaves from being taken north of Missouri, and this ordinance was doubtless a powerful factor in deflecting the immigration from Kentucky, Tennessee, Virginia and the Carolinas into Missouri. The climate and soil of Missouri were favorable to tobacco, the principal crop with which the slave owners were familiar. To this crop was added the cultivation of hemp, which was produced in large quantities along the flood plain. These two crops, tobacco and hemp, were the main crops produced by slave labor on the flood plain. To some extent the plantation system was in vogue, and many of these large plantations are still held by heirs of the original owners. Neither tobacco nor hemp is now largely produced in Missouri. They have been superceded by corn and wheat.

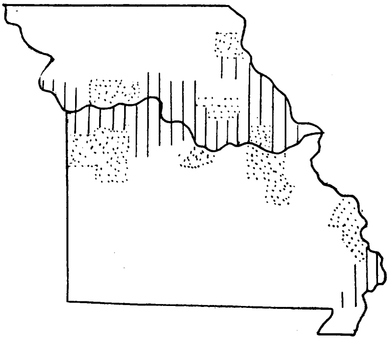

FIG. 12—Proportion of slave population in 1860. Dots indicate that slaves were 10 to 20 per cent. of population. Parallel lines, 20 to 70 per cent. of population.

Laws. The legal responses to the conditions along a graded river are interesting. The high agricultural value of much of the flood plain and the higher value of flood plain land located in cities like St. Louis and Kansas City led to many law suits, and the reports of these cases on Missouri would fill several volumes. As far as this paper is concerned, there are three principles of law that apply to the land along a graded river, namely, accretion, reliction, and and avulsion.

The Missouri river being a navigable stream, all land titles end at the water's edge. There can be no private ownership of land beneath the water. The owner of riparian lands is constantly liable to loss of land by river erosion. The legal theory is that, since the owner of such lands assumes the risk of erosion, he is entitled to any deposits which may be made upon his water-front, either by direct deposition (accretion) of the stream or by the streams withdrawing from his water front (reliction).*

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* American Decisions, Vol. 33, page 276.

However, the accretion or reliction must be "gradual and imperceptible" and not sudden (avulsion). The theory, again growing out of the habits of a graded river, is that if the erosion is "gradual and imperceptible," the property that is swept away can not again be identified.* If a house, for example, is carried away and deposited on another person's land, the owner can recover the house provided he can identify it. Of course, soil swept away cannot in like manner be reclaimed. Another reason for allowing the riparian owner title to the accretions along his water-front is that, otherwise, he would be shut off from access to the river by the accretions in front of his land.†

If land is destroyed by the river, the owner's loss is total even though the site of his property subsequently becomes land. An illustration is to be seen in Jackson County, northwest of the area described in this paper. Between 1826 and 1853 the Missouri eroded a small tract of land, but by 1896, the river had not only restored the original tract, but had added some 200 acres to the tract. However, the title was lost to the original owner when the land disappeared and it was decided that he had no claim upon the original site. (Fig. 13.)

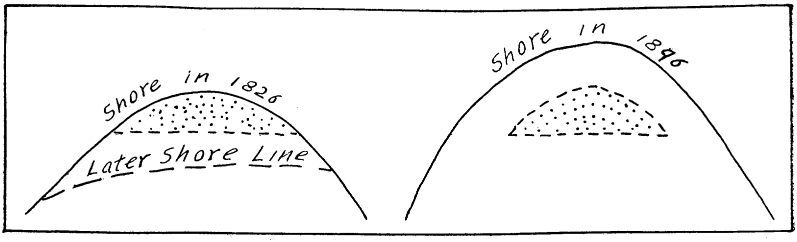

FIG. 13—The dotted area indicates the land in litigation. (Diagram from Mo. Rept., 173, p. 195, Whitcombe *vs.* Chiles.)

Islands appearing in the river belong to the State, and have to be bought from the State in order to acquire title to them. Often an island becomes connected with the shore. In such a case the riparian owner does not acquire title to the island, but only to the accretion before his water-front. In a contest as to the ownership of the land connecting an island and the mainland, it was decided that the line of division should be the middle of the abandoned channel.‡

An interesting case involving the habits of the graded Missouri and the law applying thereto was tried in 1897.* The case brought out the behavior of the Missouri from 1820 to 1897, a period of 77 years. Holmes Island, about three miles below St. Charles, and about twenty-five miles from the mouth of the Missouri, had, in 1820, a position as shown in Fig. 14. Holmes Island was purchased about 1840. In 1885, in a period of thirty-eight years, this island had almost entirely shifted down stream. The head of the island was washed away by the rapid current and, in the more quiet water on the down stream side of the island, nearly the same area had been deposited. A small island (Case Island), had formed to the northwest of Holmes Island. The situation in 1858 is shown in Fig. 15. Meantime the river was withdrawing from the south bank and leaving a portion of its deposits exposed as land. The main channel was across a part of the former site of Holmes Island.

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* Mo. Repts., Vol. 61, page 1876, Benson *vs.* Morrow.

† Mo. Repts., Vol. 118, page 403, Crandall *vs.* Allen.

‡ Mo. Repts., Vol. 86, page 209, Buse *vs.* Russell.

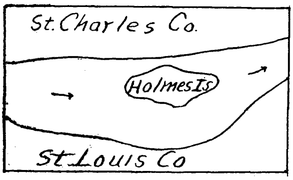

FIG. 14—Holmes Island in 1820.

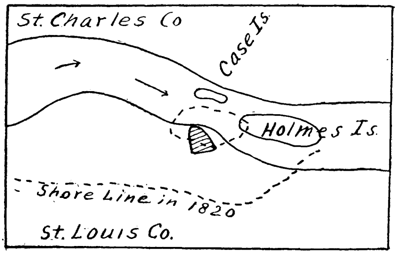

FIG. 15—Holmes Island in 1858. The broken line shows the former position of the island. The shaded area indicates the land in controversy.

Case Island was washed away and the north bank of the river was therefore the more exposed to erosion. In 1875-76 the erosion was very rapid, and the main channel rather suddenly shifted to the north of Holmes Island, leaving its old course southwest of Holmes Island practically dry. Holmes Island had, in the meanwhile, shifted still further down stream. (Fig. 16.)

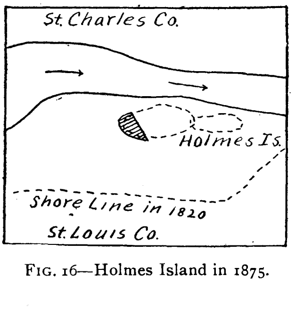

FIG. 16—Holmes Island in 1875.

It will be remembered that Holmes Island was bought in 1840. With all of its shiftings down stream the title remained in the original purchaser, and his successors, since the deposits on the lee side of the island were gradually formed contiguous to the island and were, in the eyes of the law, accretions. However, the owners of the island tried to hold possession of land which was embraced in the original deeds of the island, but which had been subsequently part of the river channel, and then had been covered by alluvium. (Figs. 14, 15, 16.) In other words, the former owners of the *site* of a portion of Holmes Island tried to hold the site notwithstanding the fact that it had formed a portion of the river channel. This contention was held contrary to law in Missouri, since the owner had lost title to the original site when it became a part of the river bed.

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* Mo. Repts., Vol. 137, page 271, Vogelsmeier *vs.* Prendergast.

Another application of river law came out in this case. The boundary between St. Charles County on the north and St. Louis County on the south is ordinarily taken as the *filum aquae* or fastest current of the river. However, it was decided that the change of 1875 was so sudden that it constituted a case of avulsion and the county line followed the old bed rather than the new channel. If space permitted many other illustrations of the legal responses to life along the graded Missouri could be given. Many of the reports are extremely interesting when they give a connected history of river activities covering a long period of time.

The statutes of Missouri provide for the drainage of swamp lands in general, which, in this State, are practically confined to the flood plains.* At present the drainage of such lands is left to the initiative and desire of the local land owners. Upon petition of owners representing a majority of the acres to be benefited, the county court appoints a commission to investigate the drainage project. If the report is favorable and accepted, the commission plans the ditches, dikes, etc., and assesses the land in proportion as it is benefited. As yet no large areas of flood plain land in Missouri have been reclaimed under this plan.

There are many indications that the former importance of the Missouri River as a free, cheap highway may be in part regained. In recent years successful attempts have been made to establish steam boat lines from St. Louis to Kansas City. The movement for inland waterways which has reached almost national importance includes the improvement of this river as one of its projects.

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* Missouri Annotated Statutes, Vol. 4.